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ABSTRACT

The Comprehensive School Mathematics Program (CSMP) is a program of CEMREL, Inc., one of the national educational laboratories, and was funded by the National Institute of Education (NIE). Its major purpose is the development of curriculum materials for kindergarten through grade 6. One of the most important questions in the evaluation of CSMP is whether the transition to junior high school mathematics is made easier or more difficult because of pupil experience with the program. This study is a preliminary investigation, a comparison of seventh-grade mathematics teachers' ratings of former CSMP versus non-CSMP students' performance in class. The summary notes the data are far from definitive, but former CSMP students seem to be doing at least as well in seventh-grade classes as students from standard programs. Three sites were examined where comparison between non-CSMP and CSMP pupils was possible. At two of these sites, former CSMP pupils received higher teacher ratings for participation in class, motivation, creativity and problem solving, and practical applications. There were no differences between th two groups at a third site. (MP)

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SE 040 345

Extended Pilot Trial of the Comprehensive School Mathematics Program

Evaluation Report 8-C-1

Preliminary Study of CSMP "Graduates"

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Math Research and Evaluation Studies
October, 1981

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Description of Evaluation Report Series

The Comprehensive School Mathematics Program (CSMP) is a program of CEMREL, Inc., one of the national educational laboratories, and is funded by the National Institute of Education. Its major purpose is the development of curriculum materials for grades K-6.

Beginning in September, 1973, CSMP materials began being used in classrooms on a regular basis, beginning in kindergarten and first grade. The evaluation activities have paralleled the development and dissemination of materials so that the primary evaluation emphasis is now at the upper elementary grades. All activities have been conducted by a group within CEMREL which is independent of CSMP.

The evaluation of the program in this extended pilot trial is intended to be reasonably comprehensive and to supply information desired by a wide variety of audiences. For that reason the reports in this series are reasonably non-technical and do not attempt to widely explore some of the related issues. On the next page is given a list of reports through 1980. Below is given a list of reports completed in 1981:

Evaluation Report: 8-B-1 Sixth Grade Evaluation, Preliminary Study

8-B-2 Evaluation of Revised Second Grade, MANS Blue Level

8-B-3 Evaluation of Revised Third Grade, MANS Green Level

8-B-4 Three Evaluations of Gifted Student Use

8-C-1 Preliminary Study of CSMP "Graduates"

Extended Pilot Trials of the
Comprehensive School Mathematics Program

Evaluation Report Series

Evaluation Report (1974)	1-A-1	Overview, Design and Instrumentation
	1-A-2	External Review of CSMP Materials
	1-A-3	Final Summary Report Year 1
	1-B-1	Mid-Year Test Data: CSMP First Grade Content
	1-B-2	End-of-Year Test Data: CSMP First Grade Content
	1-B-3	End-of-Year Test Data: Standard First Grade Content
	1-B-4	End-of-Year Test Data: CSMP Kindergarten Content
	1-B-5	Test Data on Some General Cognitive Skills
	1-B-6	Summary Test Data: Detroit Schools
	1-C-1	Teacher Training Report
	1-C-2	Observations of CSMP First Grade Classes
	1-C-3	Mid-Year Data from Teacher Questionnaires
	1-C-4	End-of-Year Data from Teacher Questionnaires
	1-C-5	Interviews with CSMP Kindergarten Teachers
	1-C-6	Analysis of Teacher Logs
Evaluation Report (1975)	2-A-1	Final Summary Report Year 2
	2-B-1	Second Grade Test Data
	2-B-2	Readministration of First Grade Test Items
	2-B-3	Student Interviews
	2-C-1	Teacher Questionnaire Data
	2-C-2	Teacher Interviews, Second Grade
	2-C-3	Teacher Interviews, First Grade
Evaluation Report (1976)	3-B-1	Second and Third Grade Test Data Year 3
	3-C-1	Teacher Questionnaire Data Year 3
Evaluation Report (1977)	4-A-1	Final Summary Report Year 4
	4-B-1	Standardized Test Data, Third Grade
	4-B-2	Mathematics Applied to Novel Situations (MANS) Test Data
	4-B-3	Individually Administered Problems, Third Grade
	4-C-1	Teacher Questionnaire Data, Third Grade
Evaluation Report (1978)	5-B-1	Fourth Grade MANS Test Data
	5-B-2	Individually Administered Problems, Fourth Grade
	5-C-1	Teacher Questionnaire and Interview Data, Fourth Grade
Evaluation Report (1979)	6-B-1	Comparative Test Data: Fourth Grade
	6-B-2	Preliminary Test Data: Fifth Grade
	6-C-1	Teacher Questionnaire Data: Grades 3-5
Evaluation Report (1980)	7-B-1	Fifth Grade Evaluation: Volume I, Summary
	7-B-2	Fifth Grade Evaluation: Volume II, Test Data
	7-B-3	Fifth Grade Evaluation: Volume III, Non-Test Data
	7-B-4	Re-evaluation of Second Grade, Revised MANS Tests
	7-B-5	Achievement of Former CSMP students at Fourth Grade
	7-B-6	Student Achievement, Rapid Implementation Model

Key to Indexing

Evaluation Reports are labelled m-X-n,
where m is the year of the pilot study, with 1973-74 as Year 1.
X is the type of data being reported where A is for overviews and summaries, B is for student outcomes and C is for other data.
n is the number within a given year and type of data.

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Introduction

One of the most important questions in the evaluation of CSMP is the ability of CSMP students to learn and do mathematics after they have completed the CSMP K-6 program and are enrolled in a "regular" mathematics program. Is the transition to junior high school mathematics made easier or more difficult because of their experience with CSMP?

Some of the characteristics of CSMP which might affect this transition are the following:

a) Different content such as probability, geometry,

b) Different emphasis (less on computational algorithms, more on various processes),

c) Different instructional strategies for teaching certain topics (such as fractions and decimals),

d) Longer lessons with frequent teacher-class dialogue (versus shorter lessons with frequent individual help by the teacher),

e) The spiral approach (versus a mastery emphasis).

The present study is a preliminary investigation of one aspect of this question, a comparison of seventh grade math teachers' ratings of former CSMP versus former Non-CSMP students' performance in class.

Design of the Study

So far, there are relatively few districts which have CSMP students who have completed six years of CSMP and are now in seventh grade. At three sites, there were at least two classes of "CSMP graduates" who were enrolled in the fall of 1981 in seventh grade of a junior high school, which school also contained many seventh graders who did not study CSMP. This partition into CSMP-Non-CSMP was always based on the elementary school the students attended.

Table 1 describes these sites.

Table 1

Participating Sites

	Type of District	Number of Contributing Elementary Schools		Number of Seventh Grade Students	
		CSMP	Non-CSMP	CSMP	Non-CSMP
Site A	Large suburban with many junior highs, This junior high located in farther reaches of district. Average SES, mostly white.	1	3	48	118
Site B	Inner Suburban with one junior high. Lower middle SES, mostly black.	1	2*	36	74*
Site C	Suburban with one junior high. High SES, mostly white.	1	4	55	210

*At Site B there were 8 Non-CSMP elementary schools altogether. For the purposes of this study only 2 were considered, the other 6 being of quite different SES and student ability levels.

At each junior high school, seventh grade math teachers were asked to rate each of their students, using a five point scale, on the following four characteristics:

A. Participation in Class

- Participates frequently
- Shows high quality of participation
- Has good listening skills long attention span
- Volunteers responses

B. Motivation

- Has strong interest in subject
- Is able to work independently
- Is interested in the "why" as well as correctness of answer
- Is willing to learn new methods and ideas

C. Creativity & Problem Solving

- Has good reasoning and logical thinking skills
- Uses new or unusual methods to solve problems
- Can defend his ideas
- Tries more than one way to solve problem

D. Practical Applications

- Shows familiarity with conventional terms & symbols
- Is able to organize and interpret information
- Applies knowledge to practical problems
- Translates new problems into familiar forms

The actual rating form given to teachers is shown in the Appendix.

Teachers were not told the purpose of the study (but were given a more general reason for the assessment), nor which students were ex-CSMP, and the form made no specific references to mathematics and, hence, could have been viewed by the teacher as a student assessment which could apply to other subject areas as well. These ratings were made during the second or third quarters of the school year.

At two of the sites it was possible to record for each student, district maintained data which could be used as a general measure of ability of the students. At Site A, this was the Reading Comprehension score from Iowa Tests of Basic Skills, administered in the spring of fifth grade. At Site C, this was the Verbal score from the Cognitive Abilities Test, also administered in fifth grade. At Site B, no such data was readily available; however the two Non-CSMP elementary schools were known from previous evaluation studies to have students with similar ability levels to the CSMP school.

At each site, a comparison between former CSMP and Non-CSMP students was then made on each of the four rating characteristics. At Sites A and C, an analysis of covariance procedure was used to take into account the ability level of students; at Site B an analysis of variance procedure was used.

In the section "Other Results", seventh grade achievement data from Site C is presented. Also given is a summary of interview data from seventh grade teachers at a fourth site, where all seventh graders were former CSMP students, and hence such a comparative study could not be conducted.

Main Results

Table 2 shows the means across students at each site for the ratings and for the covariate ability measure, where available. Also given is the number of students that this data is based on, i.e., the number with both a rating and a covariate score. The headings refer to "CSMP and "Non-CSMP"; they were of course Ex-CSMP and Ex-Non-CSMP students.

Table 2

Mean Ratings Across Students

	Site A		Site B		Site C	
	CSMP	Non-CSMP	CSMP	Non-CSMP	CSMP	Non-CSMP
A. Participation	3.2	3.4	3.2	2.7	3.1	2.9
B. Motivation	3.2	3.4	3.4	2.8	3.1	2.7
C. Creativity and Problem Solving	3.1	3.1	3.1	2.7	3.1	2.7
D. Practical Applications	3.0	3.1	3.2	2.7	3.0	2.7
Total of A-D	12.6	13.0	12.9	10.8	12.3	11.0
Covariate	41.9[1]	43.7[1]	---	--	112.3[2]	108.2[2]
Number of Students	48	118	36	74	55	210

[1]Reading Comprehension, ITBS, spring of 5th grade, raw score.

[2]Verbal Score, Cognitive Ability Test, 5th grade, raw score.

These are the mean ratings which do not take into account ability levels of the students. It can be seen that at Site A, Ex-Non-CSMP students had higher scores on the ability measure; at Site C, Ex-CSMP students scored higher. In order to take into account these differences, an analysis of covariance procedure was used for Sites A and C.

Table 3, shows the adjusted means for Sites A and C when ability of student is taken into account and repeats the observed means for Site B. Also given is the level of significance from either the Analysis of covariance (A and C) or analysis of variance (B). The degrees of freedom were substantial--at least 100-- in all cases.

Table 3

Adjusted Means (A and C) or Raw Means (B)

and Significance Tests [1]

	Site A			Site B			Site C		
	CSMP	Non-CSMP	p-value	CSMP	Non-CSMP	p-value	CSMP	Non-CSMP	p-value
A. Participation	3.3	3.4	—	3.2	2.7	.07	3.1	3.0	.50
B. Motivation	3.3	3.3	—	3.4	2.8	.05	3.0	2.8	.30
C. Creativity and Problem Solving	3.1	3.1	—	3.1	2.7	.11	3.0	2.8	.20
D. Practical Applications	3.1	3.1	—	3.2	2.7	.08	3.0	2.8	.30
Total of A-D	12.8	12.8	—	12.9	10.8	.05	12.1	11.3	.20

[1] A dash (—) indicated not significant at even the .50 level.

It can be seen that Ex-CSMP students received significantly or almost significantly higher ratings in Site B, non-significantly higher ratings in Site C and had virtually identical ratings to Ex-Non-CSMP students in Site A. There appears to have been very little discrimination by the teachers among the various ratings categories.

Other Results

From Site C

Site C, a local site, had the most complete data. Quarter grades in mathematics were recorded for each student, and a similar analysis of covariance procedure was used to assess any CSMP-Non-CSMP difference in future mathematics achievement.

Table 4 shows the adjusted mean math grades, by quarter, for Ex-CSMP and EX-Non-CSMP students and the p-value of the ANCOVA procedure.

Table 4

Adjusted Mean Math Grades, 1980-81, Site C

(A = 5, B = 4, etc.)

	CSMP	Non-CSMP	P-Value
First Quarter	3.9	3.6	.05
Second Quarter	3.8	3.5	.02
Third Quarter	3.7	3.5	.10

It can be seen that Ex-CSMP students had higher math grades in each quarter, usually significantly so.

Students were grouped according to their verbal scores, and for each such ability range, the mean math grade was calculated. This data is shown graphically in Figure 1, below.

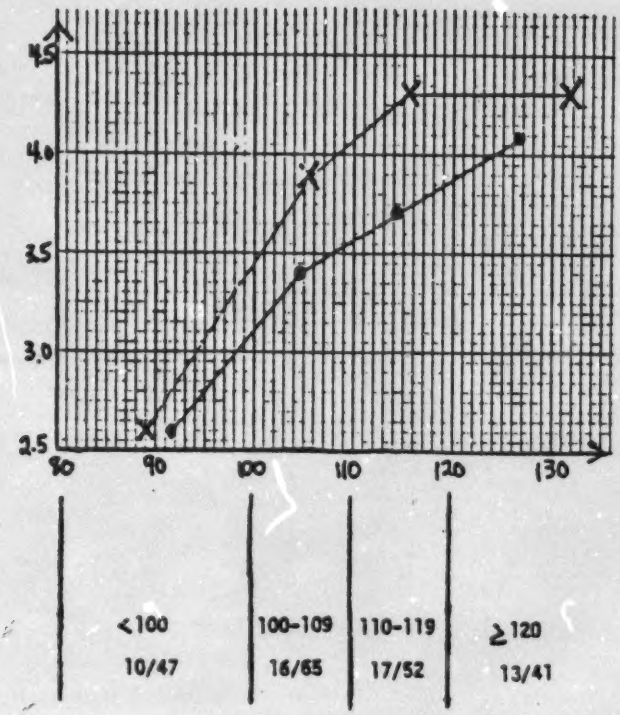

Figure 1, Mean quarter math grades by ability level, Site C
X = Mean for Ex-CSMP group, • = Mean for Ex-Non-CSMP group

Ex-CSMP students had higher grades at each ability range and, at the middle ranges, this difference was about half a grade level.

The same kind of analysis by ability levels of teacher ratings yielded the data shown in Figure 2, below, for the total of the four ratings.

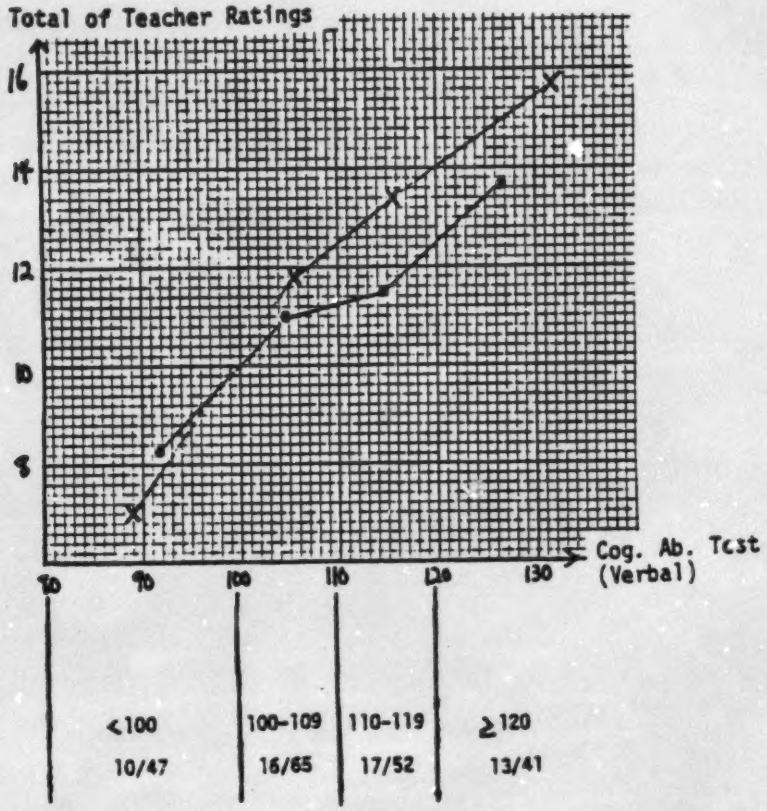

Figure 2, Mean total of teacher ratings by student ability level, Site C
X = Mean for Ex-CSMP group, • = Mean for Ex-Non-CSMP group

At the lower ability ranges, the ratings were about equal; at the higher ranges, Ex-CSMP students averaged about 2 points higher.

Site D

At a fourth site, all students in grades K-6 use CSMP. Hence all of the seventh graders (about 140 students), used CSMP and there was no control group to formally compare them with. However, the three seventh grade teachers were interviewed jointly for about an hour, on-site, and asked to informally compare the present seventh graders (Ex-CSMP) with previous classes of seventh graders (Ex-Non-CSMP).

The main, and generally agreed upon, reactions of these seventh grade teachers were the following:

- It was expected that these students would have poor computation skills; in fact the students computed quite well.
- The students were particularly well behaved; this may have been because there was a new English program or because the seventh grade group just happened to be a "good group."
- Students were just as bad as ever in word problems.
- No mention was made of better problem solving ability or thinking skills, but at this time of the year (October), not much new work had been done--mostly review and basics.
- Students were slightly better listeners, more willing to ask questions, and more willing to volunteer answers that might be quite wrong.
- "Seventh graders are seventh graders."

Summary

The data are far from definitive, but Ex-CSMP students seem to be doing at least as well in their seventh grade math classes as Ex-Non-CSMP students when ability level is controlled, and often they do better.

At two of three sites, Ex-CSMP students received higher teacher ratings for Participation in Class, Motivation, Creativity and Problem Solving, and Practical Applications; this advantage was usually significant in one of the sites, consistent but not quite significant at the other.

At the third site, there were no differences between Ex-CSMP and Ex-Non-CSMP students.

Further analysis at one of the sites showed that Ex-CSMP students received significantly higher grades in mathematics, especially those in the middle ability ranges.

Interviews with seventh grade math teachers at a fourth site, where CSMP-Non-CSMP comparisons were not possible, confirmed the view that CSMP students had no difficulty in adapting to the usual classroom activities of seventh grade, and were in some ways, better students.

APPENDIX

RATING FORM USED BY SEVENTH GRADE TEACHERS

Name of Teacher _____

Please rate each of your students on each of the following characteristics.
Use a 5-point scale: 1(low), 2, 3, 4 or 5(high)

Names of Students	A. Participation in Class - Participates frequently - Shows high quality of participation - Has good listening skills long attention span - Volunteers responses	B. Motivation - Has strong interest in subject - Is able to work independently - Is interested in the "why" as well as correctness of answer - Is willing to learn new methods and ideas	C. Creativity & Problem Solving - Has good reasoning and logical thinking skills - Uses new or unusual methods to solve problems - Can defend his ideas - Tries more than one way to solve problem	D. Practical Applications - Shows familiarity with conventional terms & symbols - Is able to organize and interpret information - Applies knowledge to practical problems - Translates new problems into familiar forms
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